

ABSTRACT

A solar energy concentrating collector having a frame with bottom, end and side panels of corrugated ~~paperboard~~ material adapted to include secondary side panels that are folded inward and have vertical slots for containment of parabolic supports for a flexible reflective surface placed on top of the supports. ~~Frame and folded side panel construction permit machine or manual folding and assembly.~~ Frame end panels have apertures located on the parabolic focal line for connection of fluid conduits outside the frame. For arrangement in solar collector arrays, conduit apertures in end-to-end mounted collectors are aligned to receive a common absorber pipe that extends through and beyond a plurality of collector frames for external ~~+30 degrees~~ connections to conduits in the next adjacent parabolic reflective surface parallel to the first reflective surface in the same frame. Supports for the reflective surface have parabolic cutouts in the top portion and are processed as multiple side by side components in a corrugating machine. ~~An odd number of collector apertures and reflective surfaces within each collector result in serial flow and inlet / outlet connections on opposite ends of the collector and in a collector array. With multiple units mounted end to end, each collector can be film overwrapped to reduce heat transfer to ambient air and protect internal components from moisture.~~

The preferred material is corrugated paperboard

MARKED UP

DETAILED DESCRIPTION OF THE INVENTION

✓ In Fig 1, solar collector panel 1 consists of a frame having a bottom surface 3, -- folded primary -- end panels 4, 4', primary side panels 5, 5' and in the preferred embodiment, inwardly folded secondary side panel extensions 10,10' (see Fig 6).

✓ In Fig 1, parabolic supports 6 {(see Figs 3, 5)} --(see Figs 3,4)-- support reflector surface 7 (shown cutaway on the left side) and are held in slot cutouts 13 in the inside folded -- secondary -- side panels 10,10'. Reflector surface 7 is bonded to an insulating substrate 17 (see Fig 3) and focuses solar rays to absorbing collector conduit 8.

✓ ✓ In Fig. 1, surface 7 extends between the inside folded --secondary side- panels 10,10' and substantially between --folded primary --end panels 4, 4'.

In Fig 2, the third slot 13 is shown without the support 6 to define its shape and length, noting that the upper slot end is above score / fold line L 4 and the bottom end is below score / fold line L7 to insure that ends of support 6 butt against surfaces of panels 10,10'.

✓ In Fig 3, absorber conduits 8 passes thru apertures 11 in the --folded primary --end panels. Vertical supports 6 with a parabolic shape 14 on the upper margin are held in slots 13 cut out from side projections 12 and support substrate 17 and superposed reflector surface 7.

In Fig. 4, cutaway supports 6 are shown without the substrate and reflector surface for clarity. Slots 13 are shown spaced from support 6 to illustrate cut out above upper fold line L4 and below lower line L7.

In practice slots 13 butt against support side surfaces without space.

✓ In Fig 4, inside folded -- secondary side --panel 10 is scored and folded to define projections 12 containing support containment slots 13 (see Figs 6,7).

✓ In Fig 5, a corrugated paperboard rectangular blank is fabricated with scored fold lines L1- L1' for end panels 4, 4', scored fold lines L2-L2' for primary side panels 5 - 5', and L3 -L3' for -- folded --secondary (extended) side panels 10, 10'.

✓ In Fig 5, co-extended --folded secondary panels 10,10' are shorter than inside panel length to avoid interference with end panel 'tabs' 15,15' which are folded inside at the corners. Leaving uncut space at the ends of panels 10,10', the first and last slots are therefore spaced from --the-- inside --of primary panel ends and the reflector substrate and surface are cantilevered between first and last supports and the respective end panels.

✓ In enlarged Fig 6, the preferred arrangement shows the overfolded --secindary-- panel 10. upper fold line L 4, top score / fold line L5 and L6 for projection 12, and lower fold line L7 to bring the bottom of panel 10 into surface contact with, and attachment to, primary side panel 5. Upper slot cut line 13 and lower cut line 13' (as described above) are shown phantom.

In another embodiment of Fig 7, a separate corrugated piece is scored and folded with projections 12 and attached to an intermediate separately processed corrugated piece (not referenced) to allow a different assembly procedure versus the overfolds of panel 10 desribed above.

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Claim 1 (Amended)

A concentrating solar collector for hot water heating comprising;

A rectangular shaped frame having a major dimension and a width, including a bottom surface, vertical end panels and side panels of pre-determined height,

A plurality of planar vertical supports for a parabolic reflector surface,

An odd numbered plurality of reflector surfaces,

An odd numbered plurality of heat absorbing conduits, wherein:

....said frame is made from a non-conducting substrate having a plurality of inner and outer sheets with at least one corrugated intermediate sheet.

....said frame substrate is shaped to include a bottom area, folded primary end panels {~~and folded~~} primary side panels equal to the height of

the frame and --inside folded -- secondary co-extensive side panels,

....said --folded primary-- end panels each having a plurality of apertures spaced transversely a distance equal to the distance between focal points of adjacent parabolic curves,

....said inside folded secondary side panels folded inside of the

primary side panel s to define at least one folded projection with slot cutouts for containment of said planer vertical supports,

....said planar supports including an odd numbered plurality of adjacent parabolic shaped cutouts along the top margin,

MARKED-UP CLAIMS

.....a plurality of reflector surfaces having a pre-selected length and a total reflective width substantially equal to the sum of adjacent parabolic surfaces,

✓ each of said apertures in the --folded primary -- end panels

✓ centered along a focal line below the upper margins of said folded primary ends panels, and passing through said end panels for serial connection to a coacting absorber conduit,

✓ the first and last of said serially connected absorber conduits connected to inlet and outlet fluid piping respectively.

· (Amended)

Claim 2 ▲ In a collector of claim 1 wherein said collector frame includes a corrugated paperboard blank with tabs extending from end panels, score lines for folding end and side primary panels, and score lines for folding the secondary --side-- panels inside the frame for superposed attachment to the primary side panels.

✓ (Amended)

Claim 3 ▲ The collector of claim 2 wherein said inside folded secondary panels {has} --have-- a plurality of scores lines in the direction of the major frame direction to form at least one inside folded projection.

Claim 4 The collector of claim 3 wherein secondary side panels have vertical slots extending above one score line and below another of said score lines.

Claim 5 The collector of claim 4 wherein said slots have a width substantially equal to the width of a reflector surface support.

Claim 6 The collector of claim 1 wherein each support includes an odd numbered plurality of parabolic shaped cutouts along the upper margin.